

We attempted to gather data to determine the relationships of *C. o. cinereocephalus* to *C. semifuscus* and of both of them to the rest of the *C. ophthalmicus* complex, but not enough information exists to do so. We predict that *C. semifuscus* will be found to be restricted to the western Andes of Colombia and Ecuador and that in Ecuador it will be actually found only on the western slopes. The only place that *C. semifuscus* and *C. ophthalmicus* have been collected together is Gualea, on the west slope of the Western Andes in Ecuador, but there is some doubt as to the actual site where the *C. ophthalmicus* specimen was collected (Zimmer 1947).

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References:

- Hellmayr, C. E. 1936. Catalogue of the birds of the Americas and the adjacent islands. *Zoological Series, Field Museum Nat. Hist.* 13: 458pp.
 Snow, D. W. 1973. The classification of the Cotingidae (Aves). *Brevoria* 409: 1-27.
 Zimmer, J. T. 1947. Studies of Peruvian birds No. 52, the genera *Sericossypha*, *Chlorospingus*, *Cnemoscopus*, *Hemispingus*, *Conothraupis*, *Chlorornis*, *Lamprospiza*, *Cissopis*, and *Schistochlamys*. *American Mus. Novitates* 1367: 1-26.

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The morphology of Sardinian Warblers *Sylvia melanocephala* and Blackcaps *S. atricapilla* resident on Gibraltar

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The Sardinian Warbler *Sylvia melanocephala* and the Blackcap *Sylvia atricapilla* are the main resident foliage-gleaning insectivores at Gibraltar. The Sardinian Warbler is common within its essentially circum-Mediterranean range (Vaurie 1959, Voous 1960), and is associated typically with Mediterranean scrub. The Blackcap is widespread in the Palaearctic, and is mostly associated with mature woodland rather than with maquis, even within the Mediterranean region (Cody & Walter 1976). At Gibraltar, the 2 species occupy maquis vegetation and are often in close contact.

During 1973-1979 Sardinian Warblers and Blackcaps were mist-netted in a 2-ha site in the maquis at Gibraltar. At least 10 visits were made to the site most months. Retraps were frequent at all times of year and this established that Sardinian Warblers were resident and that 2 Blackcap populations were involved, a resident one and a migratory one. Ringing recoveries suggest

that these migratory Blackcaps originate from Western Europe north of the Pyrenees.

MORPHOLOGY

Sardinian Warbler *Sylvia melanocephala*

Williamson (1974) recognizes 4 sub-species of *S. melanocephala*. The nominate *S. m. melanocephala* occurs on the mainland of Mediterranean Europe and in North Africa. It is also found in the Balearic Islands, Corsica, Sardinia, Malta and Sicily. In the Middle East it is replaced by *S. m. momus*. The other 2 sub-species have very local distributions, *S. m. leucogastra*, considered synonymous with *melanocephala* by Vaurie (1959), in the Canary Islands and *S. m. norrisae* in Egypt. Vaurie (1959) also accepts *S. m. pasiphae* from Crete and some Greek islands, but it is omitted by Williamson.

In all aspects, with the important exception of bill length, the Sardinian Warblers which are resident on Gibraltar fall within the range of measurements of *S. m. melanocephala* (Table 1) and have similar plumage. They are, however, longer-billed (Williamson 1974), a small sample of skins conforming with Williamson's data, which suggests the difference in bill length is a real one.

TABLE I

Measurements (mm) of Sardinian Warblers *Sylvia melanocephala* trapped at Gibraltar. (S.D. = Standard Deviation)

	Mean (N) S.D.		Mean (N) S.D.
Bill length		Tarsus length	
Adult ♂	14.0(13) 0.81	Adult ♂	19.3(13) 1.31
Adult ♀	13.9(10) 0.70	Adult ♀	20.1(10) 1.74
Juvenile	13.7(73) 0.77	Juvenile	20.5(73) 1.68
Wing length		Tail length	
Adult ♂	58.2(13) 1.09	Adult ♂	59.4(13) 2.62
Adult ♀	58.1(10) 0.74	Adult ♀	56.3(8) 3.16
Juvenile	58.1(140) 1.68	Juvenile	57.1(71) 2.68

Bill, tarsus and tail measured with calipers to the nearest 0.1 mm. Wing measured with ruler to nearest mm (flattened measurement). $P > 0.05$ in all cases.

Blackcap *Sylvia atricapilla*

Throughout the whole of the Palaearctic mainland the Blackcap is divided into 2 sub-species, the nominate *S. a. atricapilla* in the west, and *S. a. dammbolzi* in the east (Vaurie 1959). Several sub-species have also been described from islands. Vaurie (1959) recognizes *S. a. paulucci* in Sardinia and *S. a. heineken* from Madeira (Williamson (1974) adds the Canary Islands). Williamson recognizes the form *S. a. koenigi* from the Balearic Islands and also *S. a. atlantis* from the Azores and Cape Verde Islands. In general, the island forms appear darker than those of the mainland and some have shorter wings. In all island forms, the position of the tip of the second primary lies between the tips of primaries 6 and 7, or even between 7 and 8. In the nominate race this is rare, the tip of the second primary usually being in line with the tips of primaries 5 and 6 (Williamson 1974 and pers. obs.).

In Europe there is some evidence of a cline in some characters from west to east (Vaurie 1959), but in a series of skins examined at the British Museum (Natural History) I have not found any indication of grading of characters between northern and southern Europe. Nevertheless, the resident Blackcap at Gibraltar differs recognisably from the more northern nominate sub-species in several characters. Since migrant nominate birds are present at

Gibraltar alongside local birds from September to May, a comparative morphological analysis was possible using data gathered by a single observer.

Birds exhibiting the characteristics of local Blackcaps were ringed and retrapped at all times of year. During the breeding season (April–July) adults showing these characteristics were recorded nesting in the maquis and trapped birds had brood patches. Birds with characteristics of nominate birds were only trapped between September (a few) and May. They were never recorded breeding on Gibraltar. Some of these birds were trapped in subsequent winters.

The local Gibraltar form is smaller than the nominate and weighs less. Weights of 30 local Blackcaps trapped in mid-winter (all during the morning) were significantly lower than those of 30 nominate birds trapped under the same conditions (Table 2).

TABLE 2

Morphological differences between local and nominate Blackcaps *Sylvia atricapilla* trapped at Gibraltar. (S.D.=standard deviation).

	Local population		Nominate race		Probability of difference
	Mean(N)	S.D.	Mean(N)	S.D.	
Bill length (mm)	14.0(22)	0.969	14.2(14)	0.512	> 0.05
Wing length (mm)	68.6(30)	2.185	74.1(30)	1.874	< 0.001
Tarsus length (mm)	20.1(22)	1.365	19.8(14)	0.839	> 0.05
Tail length (mm)	59.1(22)	2.223	57.7(14)	1.917	> 0.05
Weight (g)	17.6(30)	0.916	18.6(30)	1.529	< 0.01
Tail:Wing ratio	86.15(22)		79.76(12)		—
Roundness of wing	80.80(23)	2.477	77.66(12)	1.733	—

Measurements as Table 1. Weight measured to nearest 0.1 g.

The wing is shorter in the local Blackcap, but bill and tarsus length are similar to the nominate (Table 2). The tail appears to be slightly longer in the local form than in the nominate but the difference is not significant. The wing relative to weight is shorter in the local Blackcap than in the nominate, indicating that the shorter wing is not just due to the bird's smaller overall size. The tail: wing-length ratio is higher in the local Blackcap (i.e. the tail is longer in relation to the wing), but this may be due to the reduction in wing length.

The index of roundness (as defined by Gaston 1974) shows that the wing is more rounded in the local form than in the nominate (Table 2). The wing formula of the local Blackcap differs from that of the nominate in several ways. The wing point is more frequently the fourth primary in the local Blackcap and the third in the nominate sub-species, but this is not exclusive. Primaries 1, 6, 7, 8, 9 and 10, and the first secondary are significantly longer, relative to the length of the wing, in the local Blackcap (Table 3). In the local Blackcap the position of the tip of the 2nd primary corresponds to that of the island forms, lying between the tips of primaries 6 and 7, very rarely between 5 and 6, which position is the rule in the nominate sub-species.

In the local form the plumage in general is much darker than in the nominate form. The upper parts are a dark olive, which extends to the rump. The nape is dark grey, only slightly greyer than the rest of the upper parts in the female, but more conspicuous in the male. The crown is jet black in the male and reddish-brown in the female. The wings and tail are dark

brown. The under parts are greyer, less white, than in the nominate. The flanks are a uniform dark buffish-olive. The under-tail coverts are like the flanks, the throat and breast are grey buffish-olive. The belly is dirty white, with a greyish tinge towards the breast.

TABLE 3

Relative lengths of flight feathers (mm, distant from wing point) in local and nominate Blackcaps *Sylvia atricapilla* trapped at Gibraltar.

Primary	Distance(mm) from wing point (N)	S.D.	95% Confidence Limits
1st			
Local	35.0(22)	1.988	34.2-35.8
Nominate	37.7(13)	1.932	36.7-38.7
2nd			
Local	6.4(23)	0.988	6.0-6.8
Nominate	5.7(13)	1.032	5.1-6.3
3rd			
Local	0.2(23)	0.422	0-0.4
Nominate	0=pt(14)	—	—
4th			
Local	0=pt(23)	—	—
Nominate	0.1(14)	0.267	0-0.2
5th			
Local	1.9(23)	0.733	1.6-2.2
Nominate	2.5(13)	1.330	1.8-3.2
6th			
Local	5.4(23)	0.935	5.0-5.8
Nominate	7.1(13)	1.754	6.2-8.1
7th			
Local	7.5(22)	1.074	7.1-8.0
Nominate	10.5(13)	1.506	9.7-11.3
8th			
Local	9.7(23)	1.265	9.2-10.2
Nominate	12.3(12)	1.357	11.5-13.1
9th			
Local	11.1(23)	1.290	10.6-11.6
Nominate	14.3(14)	1.729	13.4-15.2
10th			
Local	13.1(22)	1.521	12.5-13.7
Nominate	16.4(14)	1.447	15.6-17.2
11th-Secondary			
Local	16.9(22)	1.670	16.2-17.6
Nominate	19.6(14)	1.447	18.8-20.4

Primaries numbered descendantly; secondaries ascendantly.

The local Blackcaps also differ from the island sub-species in several ways. They are more olive, less grey, on the upper parts than *S. a. paulucci*. The range of wing length given for the latter race is 68-74 mm (Williamson 1974), some of them therefore having longer wings than the Gibraltar form (maximum recorded wing length = 72 mm). Similarly *S. a. heineken* (70-77 mm) and *S. a. atlantis* (69-78 mm) also have longer-winged individuals than

the Gibraltar form. Both *S. a. heineken* and *S. a. atlantis* have melanistic forms, but no such type has been found in Gibraltar. The separation of the Gibraltar form from *S. a. koenigi* is less clear, as this sub-species appears to have been identified from only 3 male skins, and comparative quantitative data cannot be used to distinguish them.

DISCUSSION

The 2 resident *Sylvia* species on Gibraltar thus differ morphologically from other known forms of their own species. The Blackcaps resident on Gibraltar have some resemblance to some of the island forms but it is unlikely that they share a common ancestor. It is more likely that these similarities are due to similar selective pressures acting in the different geographical areas. Most of the island forms have shorter, more rounded wings than the migratory forms, probably as a result of their sedentary existence (Gaston 1974).

It is not known if the Gibraltar variants of the Sardinian Warbler and the Blackcap are restricted to the Rock. The Sardinian Warbler is widespread in the area around Gibraltar and there ought to be considerable gene flow between populations in the area, preventing the Gibraltar population from becoming genetically isolated (note however that of over 800 Sardinian Warblers ringed at Gibraltar none has been recovered in Spain or Morocco). The Blackcap, on the other hand, is a rare nesting species in the Spanish hinterland and along the Moroccan coastline (Professor F. Bernis, Dr C. M. Herrera, Mr J. Pineau, pers. comm.), and the Gibraltar population may on that account be genetically isolated; at least the chances of this being the case must be greater than for the Sardinian Warbler population. Irby (1895) commonly found the Blackcap on the Rock, but only a few pairs nested there, mainly in gardens; it may have established a good foothold there only recently as a breeding species, though alternatively the few seen by Irby may have been remnants of a larger breeding population when Gibraltar was wooded (Finlayson 1979).

It is not possible to be certain of the reasons for the variations described. It is likely that the Gibraltar Blackcap has recently invaded the maquis on the Rock (Finlayson 1979) and that it has become morphologically adapted to this new breeding habitat. A shortening and rounding of the wing, an increase in the wing:tail ratio, and a decrease in size, are modifications consistent with species colonizing denser and lower vegetation than they have previously occupied (Gaston 1974). In this aspect the Blackcap is converging significantly with the Sardinian Warbler which is a typical maquis inhabitant. The local Sardinian Warbler may not differ from others in the neighbourhood of Gibraltar, but if the bill of Gibraltar birds is in fact longer, it may be an adaptation to taking a wider range of prey items than normal, since the range of breeding *Sylvia* species on Gibraltar is very small. In other words, if the long beak is typical of the Gibraltar population, it could have evolved as a form of character release (Grant 1972).

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References:

- Cody, M. L. & Walter, H. 1976. Habitat selection and inter-specific interactions among Mediterranean sylviid warblers. *Oikos* 27: 210-238.
- Finlayson, J. C. 1979. The Ecology and Behaviour of Closely Related Species at Gibraltar (with special reference to swifts and warblers). D.Phil. thesis, Oxford.
- Gaston, A. 1974. Adaptation in the genus *Phylloscopus*. *Ibis* 116: 432-450.
- Grant, P. R. 1972. Convergent and divergent character displacement. *Biol. J. Linn. Soc.* 4: 39-68.
- Irby, L. H. 1895. *The Ornithology of the Straits of Gibraltar*. London: Taylor & Francis.
- Vaurie, C. 1959. *The Birds of the Palearctic Fauna*. Witherby: London.
- Voous, K. H. 1960. *Atlas of European Birds*. Nelson.
- Williamson, K. 1974. *Identification for Ringers*. BTO Field Guides, Nos. 7-9 (Genera *Cettia*, *Locustella*, *Acrocephalus*, *Hippolais*, *Phylloscopus*, *Sylvia*).

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Three bird species new to Bolivia

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Fieldwork conducted in the Departamento La Paz, Bolivia by the authors during summer 1980 produced specimens of 3 bird species not previously recorded from the country.

CHAMAEPETES GOUDOTII Sickie-winged Guan

On 17 June, Cardiff collected 2 of this species, probably a mated pair, in humid Temperate zone forest at Cotapata (=Cocapata on some maps), 4.5 km WNW Chuspipata, alt. 3300 m:— Louisiana State University Museum of Zoology (LSUMZ) 95593, ♂, testes 7 x 2.5 mm; 740 g, heavy fat; and LSUMZ 95594, ♀, ovary 17 x 12 mm, largest ovum 4 mm diameter; 778 g, heavy fat. Both birds had been feeding on hard purple fruit (7 mm diameter), several types of seeds (1 mm dia., 4 mm dia., and 4 x 4 x 6 mm), and pebbles (stomach contents of LSUMZ 95593 deposited in LSUMZ Stomach Contents Collection). Cardiff secured another specimen on 21 June at the same locality: LSUMZ 95595, ♀, ovary 20 x 10 mm, largest ovum 4.5 mm dia., 772 g, heavy fat, stomach full of reddish fruit 4 mm dia., black seeds of 1 mm dia., some leaf parts, and pebbles. All birds were observed in the top or middle levels of trees 10-13 m in height. These were the only definite sightings made of this species during our 28 full days at Cotapata (28 May-24 June). The 3 specimens represent a distinct new subspecies to be described elsewhere (Cardiff in prep.).

The Sickie-winged Guan had not been recorded previously south of Dpto. Junin, Peru (Meyer de Schauensee 1966, Delacour & Amadon 1973). It probably has a continuous distribution in appropriate habitat types from Colombia to central Bolivia, but it is easily overlooked due to its secretive habits, this possibly accounting for the apparent large gap in the southern portion of the range. Although most authors list the Sickie-winged Guan as occurring in Temperate as well as Subtropical zone forest (Meyer de Schauensee 1966, Delacour & Amadon 1973), the Cotapata records appear to be at an unusually high altitude for this species. Intensive fieldwork in the